



# Macro Level Simulation Model of an Automotive Engine Assembly Plant

## PROJECT SUMMARY

PMC was requested to develop a planning tool to perform 'rough-cut' or 'macro' level analyses of a proposed facility for a major automotive manufacturer. The client was preparing to purchase equipment for a new engine program. Initially, high-level macro simulation models of each of the five engine-component machining departments (cylinder block, camshaft, crankshaft, cylinder head and connecting rod), as well as a macro model of the assembly and test areas were developed. These six simulation models were then combined into a high level model of the entire engine plant.

## OPPORTUNITY

Prior to purchasing equipment for a new engine program, the client needed a planning tool to make 'rough-cut' or 'macro' level analysis of the proposed facility.

## APPROACH

The objective of the simulation project was to evaluate the proposed plant using various layout configurations, scheduling scenarios, buffer capacities, changeover strategies and manpower levels.

## SOLUTION

The simulation study was done in several steps. First, a simulation project design specification was developed. Next, an EXCEL spreadsheet for each component machining and assembly line was constructed. These spreadsheets were used to compile the necessary simulation input data and to document each simulation run.

Concurrent to the construction of the spreadsheets, the six macro level simulation models of the machining and assembly lines were built. These macro models were used to verify throughput rates and intra-departmental buffer contents. In this phase of the project, the lines were evaluated using various machine efficiency rates, number of machines, material transportation times, buffer capacities between operations and production schedules.

The next step of the simulation project was to combine the component macro models into a model of the entire plant. This combined model was used to verify the plant throughput rate and inter-departmental buffer contents for the entire plant using various buffer capacities between departments, production schedules and operating patterns.

## BENEFIT

The client was able to evaluate and modify the proposed engine plant design before purchasing any equipment. The cost of the simulation project was approximately **0.01%** (one hundredth of one percent) of the cost of the total manufacturing facility.